

fair amount of gloss. I have three clutches in my collection, and as they show a good deal of variation I will describe each one.

- (1) Ground-colour, pale greenish-buff; round the broad end of the eggs a very indistinct, almost obsolete, zone of a slightly darker shade of the same colour.
- (2) Ground-colour, pale drab; round the broad end of the eggs a distinct zone of dark-buff.
- (3) Ground-colour, creamy-buff; round the middle of the eggs a broad and very distinct zone consisting of confluent blotches of brown. In this clutch the whole shell is covered with small, almost obsolete, spots of pale greenish-brown.

The measurements of the eggs are in inches, $\cdot 55$ to $\cdot 65$ long by $\cdot 43$ to $\cdot 46$ broad.

All nests were found in the months of October and November.

XV.—*On the Eggs of the Puffin, Fratercula artica.*

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(Plate II.)

VERY few eggs have been more neglected than those of *Fratercula arctica*.

In most collections they are generally represented by one or two indifferent specimens, selected for their superficial markings. Those which appear to be unmarked are regarded as uninteresting or wholly unworthy of a place in the cabinet.

From a strictly oological point of view these apparently unmarked eggs are most interesting, and on a closer examination many of them will be found to be, not only well-marked, but often heavily pigmented.

To the unaided eye, however, nine-tenths of these markings are invisible, owing to their being very deep-lying. In order to reach this pigment it is necessary to remove, by scraping, the outermost glutinous layer, and also the outer lime layer, before the pigment is reached; *this, as*



EGGS OF FRATERCULA ARCTICA.

Figs. 1-6 unilluminated Figs. 1a-6a illuminated.

with nearly all other eggs, will be found to be the same colour as the superficial pigment. The thin lime layer which covers the underlying pigment is entirely responsible for the various shades of grey and mauve which are partly visible to the unaided eye, and which are usually called shell or underlying markings.

I found, however, that the scraping away of the lime was not altogether satisfactory or sufficient to expose the whole of the hidden pigment, or to give an accurate idea as to the density and abundance of the pigment; pigment was found overlying pigment with the thinnest possible lime layer in between. There was also the danger of the whole structure collapsing, it being necessary in some instances to remove the lime almost to the membrane.

If the egg is held to a strong artificial light, and it is examined through the blowhole, much of this pigment can be seen; even this method is insufficient, and only partly reveals the great beauty of the eggs as a whole.

Both of the foregoing experiments, I believe, are known to many oologists, and are perhaps sufficient for some purposes; they do not, however, as already pointed out, convey the slightest idea as to how heavily pigmented these eggs really are.

The following original experiment—of which I gave a demonstration at the last oological Dinner on 14 September, 1921, and again at the October meeting of the B.O.C.—gives the most remarkable results, as the photographs (Plate II.) appended to this article testify. The upper six eggs (figs. 1-6) on the plate are unilluminated, the lower six (figs. 1 a-6 a) are the same eggs illuminated with electricity from inside the eggs; from the lower figures it will be seen that the eggs are as well marked as some of the most heavily pigmented eggs of *Alca torda*, to which it will be seen, when illuminated, they have some affinity in regard to the form and arrangement of the markings. They were illuminated from six dry batteries with half-inch bulbs inside each egg.

Puffins' eggs are obviously in a very rudimentary stage. What useful purpose do these concealed markings serve? They cannot in any way help to protect or conceal the eggs.

Is there a reversionary tendency? I am prompted to answer my own question in the negative. They are, in my opinion, passing through a fairly rapid transition stage, *i. e.*, the pigment apparently is becoming more superimposed; recently taken eggs show a distinct tendency in this direction, many eggs exhibiting large, well-defined superficial markings. Eggs taken thirty or forty years ago were rarely surface marked. Some of those figured in various works were obviously picked for the purpose, and were not typical eggs of the times.

My opinion in regard to this is based on the following facts:—In 1919 these eggs were collected in large quantities for food, and I had the opportunity to examine some hundreds from Barra. There was scarcely an egg among them that was not well marked. I was so struck by this interesting fact that I got into communication with the collectors who had gathered Puffins' eggs for many years, and I found they had already noticed these well-marked eggs, mentioning that the eggs they collected thirty to thirty-five years ago were nearly all unmarked.

If Saunders's, Seebohm's, and Dresser's descriptions of the ground-colour were characteristic of the eggs of this time, *i. e.*, white or dull white, there are strong grounds for assuming that the ground-colour has also considerably changed.

My own experience is that white correctly describes the eggs of that time. I now find the following ground-colour in recently taken eggs:—Ochraceous, buff, cream, greyish white, white-tinged mauve, and pale pink; the last, however, soon fades.

The colour of the pigment, which is brownish black to pale brown, remains unchanged. The shape is constant, broad pointed ovals predominating. Those, however, which I collected in the Faroes in 1905 are very distinctive; they are longer and narrower, as the following measurements show:— 66.3×41.7 , 63.2×40 , 64×41 , 63.2×42 mm.; the average measurements of ten British eggs (in my own collection) are 61.4×43.2 mm.